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Dear Executive:

B-1B DEFENSIVE AVIONICS PROBLEMS FORCE TEST LINE FLEXIBILITY

The electronics countermeasures upgrade for the B-1B is likely to be another fatality of the zero-growth Defense budget. On April 6 the Air Force requested that Congress raise the B-1B spending cap of $20.5 billion (FY-81$) by $380 million in order to correct the persistent problems with the Eaton ALQ-161A ECM system. However, Congress is likely to balk at providing additional funds required to bring the aircraft up to original Air Force specifications and give it a credible penetration capability, arguing that the upgrade would not be completed until at least 1993, only two years before estimated B-2 IOC.

When the Air Force first identified the B-1B's defensive avionics problems in June 1988, it had already issued a $2.1 billion contract to Boeing Military Airplanes for weapons/avionics test equipment, including 120 test lines and operations and maintenance manuals. Unsure at the time whether the ECM upgrade would be approved, the Air Force stipulated that the test line and O&M procedures be fully consistent with the service's modular automated test equipment (MATE) specifications so that eventual system progression or retrogression, as the case may be, could be accommodated. (continued p. 2)

SPECIAL MODULAR ARCHITECTURE ISSUE

MODULAR AVIONICS SYSTEMS ARCHITECTURE (MASA) will be the subject of an open forum at the Aeronautical Systems Division, Wright-Patterson AFB, Ohio, from Dec. 4-6. The MASA Program Office is "investigating current modular avionics concepts and evolving technologies to determine the applicability of modular avionics to retrofit aircraft." Activities at the forum will include program status briefings, selected special interest briefings, a Joint Integrated Avionics Working Group (JIAWG) update, and continued development of the MASA handbook. (Register by Nov. 20. For more info. call 513/255-7999.)

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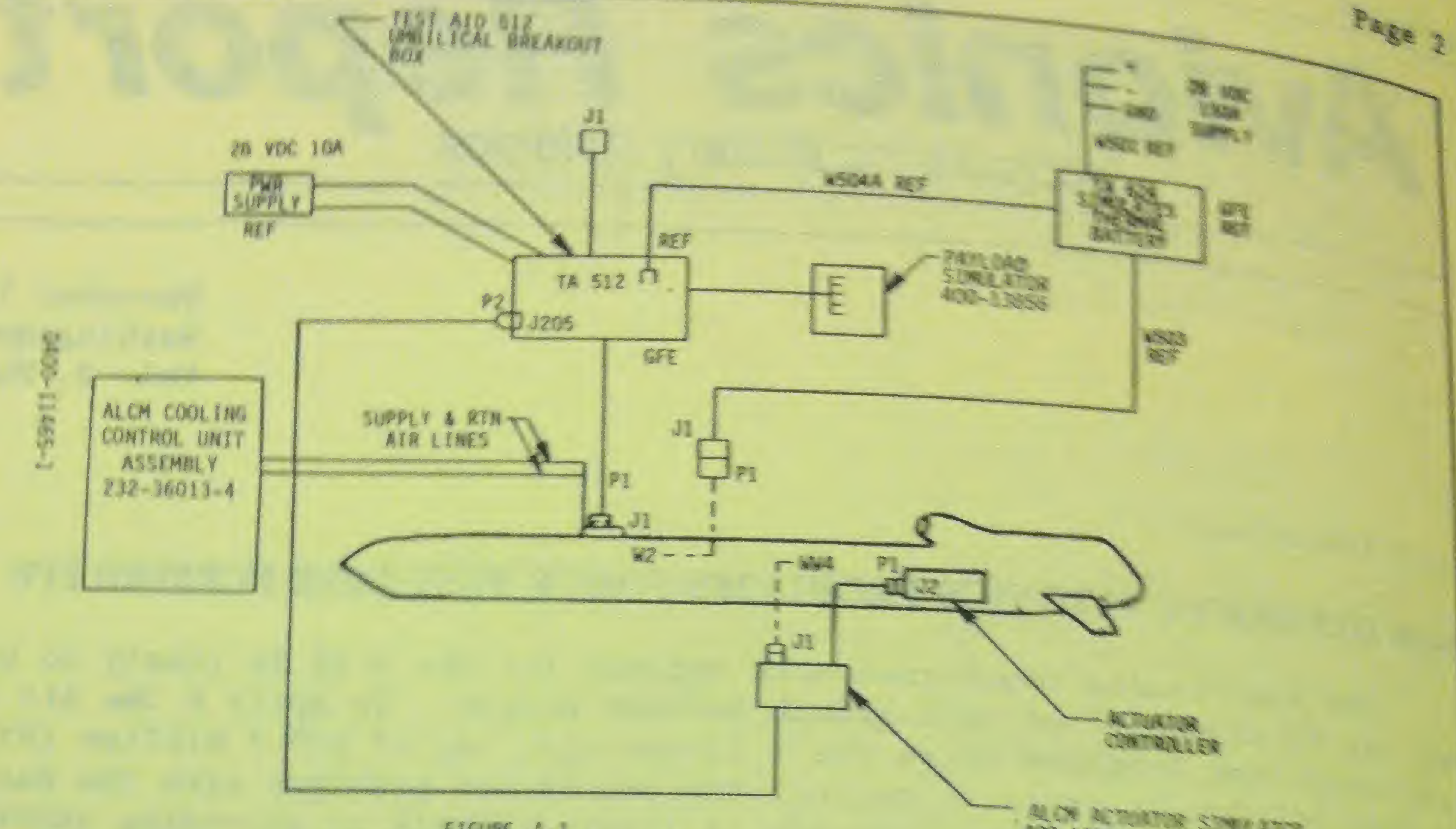

FIGURE A-1
ALCM ACTUATOR SIMULATOR & PAYLOAD SIMULATOR
INTERCONNECTION DIAGRAM

MATE is an initiative to reduce operational, logistics and support costs by setting standards for commercial testing equipment and procuring integrated test lines that service an aircraft's entire weapons/avionics system. The program is also designed to promote modular test equipment which, though integrated into a test line servicing a specific aircraft, can cope with system growth or be used in other test lines. The Air Force also specified that test equipment be ruggedized in order to support aircraft deployed to forward bases. MATE standards are paralleled in the Navy by the consolidated automated support system (CASS) and by the Army's intermediate field test equipment (IFTE) program.

To date the Air Force program has had limited success. The defense industry has experienced difficulty in designing fully modular systems using more commercially produced MATE-compliant equipment, maintaining that most is inadequate to support complex avionics systems. Boeing has been no exception. An electrical engineer in the company's Special Test Equipment Design Division, explains that, "because of the very specific tasks and the use of MIL-STD-1553 busses, little commercial ATE could be used in the B-1B line."

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Boeing's recently completed weapons/avionics test line for the B-1B includes the integrated test station, system simulators as well as ALCM and SRAM A test materials. In all areas only sparing use is made of commercial ATE. Commercial power supplies, ranging from 5-VDC 1-A to 28-VDC 10-A, along with Loral Instrumentation's SBA 100A Serial Bus Analyzer and Tektronix frame synchronization buffer devices represent most of the commercial equipment in the entire test line.

Of the millions of test functions conducted on the line, less than one percent can be accommodated by this commercial equipment. High-speed digital instrument requirements dictate specific in-house solutions. David Witts, defense marketing manager at Schlumberger Technologies, San Jose, Calif., a leading commercial ATE manufacturer, does not feel that defense contractors can take better advantage of commercial ATE until "they can supply digital-pin electronics in the 80 MHz range."

Nevertheless, Boeing's test line and O&M procedures have fully incorporated some recent developments in ATE technology that should facilitate system evolution. The integrated test station (ITS) can test all of the B-1B's 33 Line Replaceable Units (LRUs) in any combination. The ITS is linked to software-controlled simulators programmed to replicate the electronic outputs of a given avionics device. The four principal simulators are the Defensive Avionics Simulator (DSS), the Radar Data Simulator (RDS), the Vehicle System Simulator (VSS) and the Weapons System Simulator (WSS). The DSS can simulate current ECM limitations permitting realistic functional testing of the rest of the system.

William McCullough, B-1B avionics program manager at Boeing Military Airplanes, told AVIONICS REPORT that he is confident that "with this diverse simulator architecture, the Boeing ITS will be able to cope with whatever happens with the ALQ-161A." "When Hill politics and Defense plans collide toward the end of system development, the engineers have to pick up the pieces."

UNISYS COMMON MODULE MEETS JIAWG SPECIFICATIONS

Unisys Defense Systems has delivered more than 100 Common Modules, the core components of the complex information processing systems on new, advanced aircraft, the company recently announced.

When designed into aircraft, common modules promise to lower development costs due to a baseline of existing modules and to lower maintenance costs by eliminating intermediate level maintenance (modules are simply replaced at the organization level). Common modules also extend the operational life of aircraft because the open architecture design of the common module facilitates the addition of technology improvements to the base system. Up to 40 percent of the cost of advanced military aircraft is avionics.

Unisys delivered its first operational module in October 1988. The Unisys Common Module is based on a specification developed by the Joint Integrated Avionics Working Group (JIAWG), an organization formed to create a common set of avionics with a common open architecture for such programs as Advanced Tactical Fighter (ATF), the Advanced Tactical Aircraft (ATA) and Light Helicopter Experimental (LHX).

These specifications resulted in avionics built to Standard Electronic Module (SEM) E size (5.88" x 6.4" x .6") specifications. Unisys has invested heavily in the early stages of the common module program and has incorporated such features as ceramic substrates, VHSIC chips and in-module automatic diagnostics.

The company has delivered four different types of common modules:

1. A MIL-STD-1750A processor with a 32-bit internal architecture and a demonstrated performance of 3.85 MIPS (millions of instructions per second) with one megabyte of memory.

2. A 50 Megabit high-speed data bus designed with the same 1750A processor and .5 megabytes of memory.
3. Bulk memory with storage capacity of four megabytes.
4. Power supply that provides 240 watts of output from a single module weighing a pound and a half.

Two new Common Modules now in development include a RISC 32-bit processor and 1553B/1773 module.

To support development projects the Unisys Common Modules include a full set of software development and hardware integration tools.

Simulators

BOEING LEADS CONTRACTOR TEAM TO DEVELOP ADVANCED AVIONICS TESTBED

Proving equipment feasibility prior to full-scale development (FSD), getting real life flight data prior to any production and having realistic expectations for all airborne avionics are the major benefits for Boeing's Advanced Avionics Testbed (AAT), a multi-contractor effort led by Boeing Military Airplanes to develop data on emerging technologies including defensive and offensive avionics.

Using a modified 720B aircraft as the testbed, the three-phase project is proving the value of using a "flying laboratory" to speed concept development of new technologies, while providing an early evaluation of how well they work.

While discussions have been and are currently under way for specific uses of the testbed, Boeing's avionics program manager Bill McCullough told AVIONICS REPORT in an interview last week that "there are three areas that have very high interest (among DOD officials and others)."

Those three areas, McCullough said, include the real-time route planner, the offboard device and the precision direction finder.

Phase I flight tests (January-June 1989) involved 23 flights -- about 100 hours on-range testing of threat systems which included SAM monopulse radars and modern airborne interceptors and an analysis of test systems which included the advanced interferometer, advanced monopulse countermeasures, offboard ECM and integration and control.

Phase II flight test (September-December 1989) have included the advanced system management using expert system software, digital map aided terrain-following, real-time route planner, continuation of offboard ECM, missile warning systems and advanced integration and control concepts.

Phase III flight test (spring-fall 1990) will include positionable towed SRT platform, offboard ECM, digital map aided terrain-following, sensor fusion for SRT application, missile application countermeasures and integration concepts.

Boeing's McCullough explained that the Boeing-developed real-time route planner can make a change in four to six seconds in comparison to the prior technique "which took in excess of some hours."

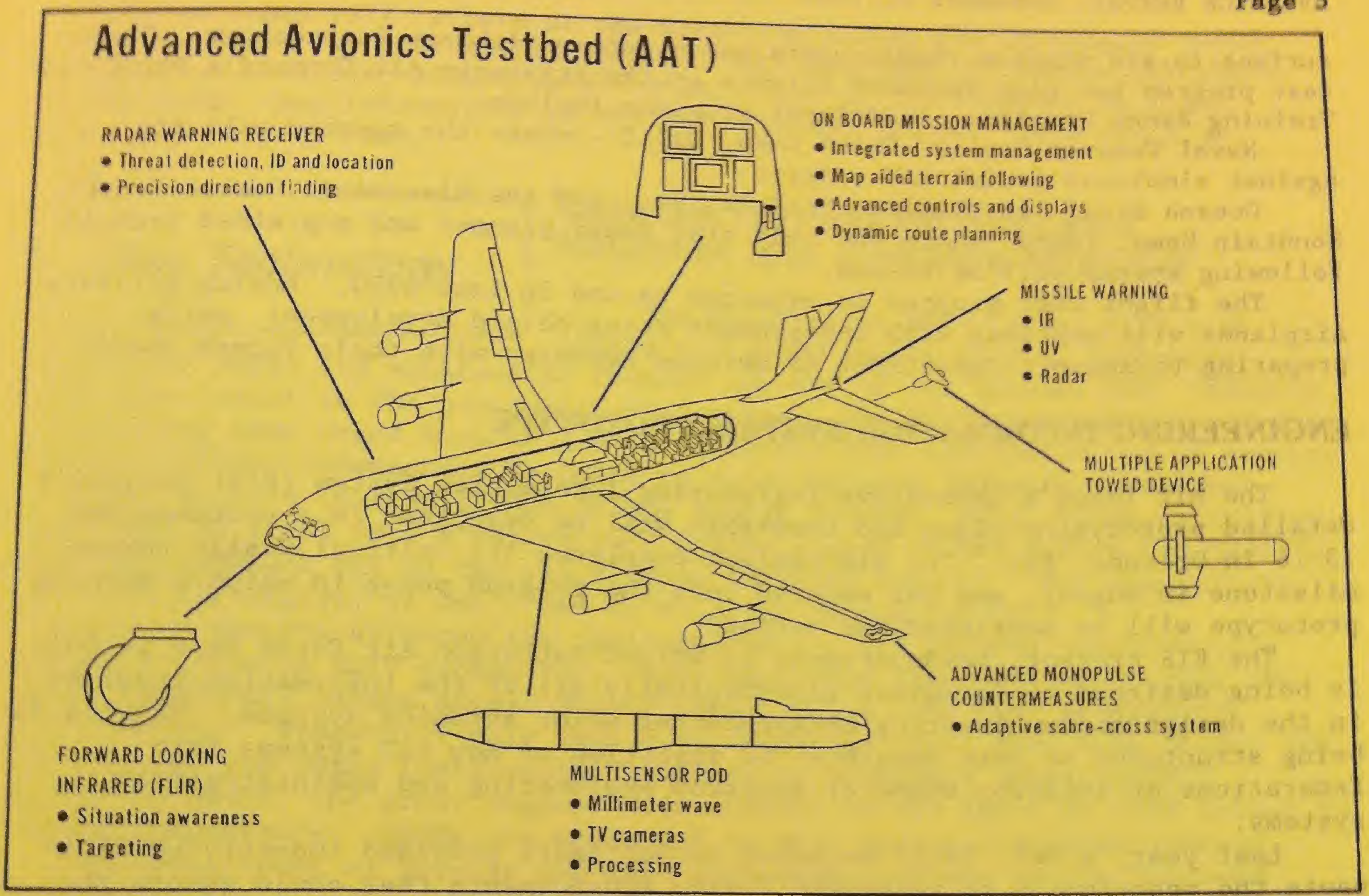
With the offboard device, McCullough said that Tracor was the developer and that it has been "successfully integrated with the Boeing system."

Finally, McCullough said that one of the keys to survivability is the precision direction finder which, in the advanced avionics testbed, can provide the precise "location of the bearing of the threat."

AAT team members include Ferranti, Tracor Aerospace, Loral Electronic Systems, Sedco, Electro-Radiation Inc. (ERI), and FLIR Inc.

The Boeing AAT program allows for concept development/demonstration of new technologies before a decision is made for full-scale development. This concept follows the new Air Force Regulation 57-1 acquisition process, which calls for multiple phases prior to proceeding with FSD (phases include mission area analysis, concept exploration and demonstration/validation).

McCullough explained that the $7-8 million a year spent by Boeing in independent research and development has been ongoing for about the past


Advanced Avionics Testbed (AAT)
RADAR WARNING RECEIVER
• Threat detection, ID and location
• Precision direction finding
ON BOARD MISSION MANAGEMENT
• Integrated system management
• Map aided terrain following
• Advanced controls and displays
• Dynamic route planning
MISSILE WARNING
• IR
• UV
• Radar
MULTIPLE APPLICATION TOWED DEVICE
ADVANCED MONOPULSE COUNTERMEASURES
• Adaptive sabre-cross system
FORWARD LOOKING INFRARED (FLIR)
• Situation awareness
• Targeting
MULTISENSOR POD
• Millimeter wave
• TV cameras
• Processing

year and a half. The ADA software refinements developed over the last three years have stemmed from the Jovial software about five years ago.

ERI's AAT program representative Paul Berkowitz told Avionics Report that the AAT "in a unique capability...with major benefits for the developer, the integrator and the government as well."

For the first time, Berkowitz explained, designers can make real time changes as they test the hardware in flight--all prior to full scale development. In conventional development, you have laboratory hardware testing, full scale development, flight and then production. With AAT, Berkowitz said, "you minimize the differences between FSD hardware and production hardware."

The major payoff, Berkowitz added, "comes in between laboratory hardware development and testing and full scale development. And the second payoff comes in between full scale production and flight."

Working out optimum configurations and avionics integration approaches prior to FSD helps the customer avoid higher costs, performance shortfalls and schedule delays, Boeing says.

Avionics subsystems, including radar warning receivers, advanced electronic countermeasures and offensive system equipment were integrated into the testbed airplane by Boeing. Boeing also provided a core system with databus, flexible controls, displays and test instrumentation, making the aircraft easily adaptable for testing a variety of avionics systems and subsystems. A towed decoy was provided by a Tracor Aerospace/Boeing team.

Integration work was performed at Boeing's system integration laboratory in Seattle. The aircraft's main cabin was modified to support systems, test equipment and new instrumentation. Antennae were installed in the wing tips, nose and tail. Towed electronic countermeasures equipment was also added to the tail section. The airplane can carry 25 observers and 15 test engineers, who can modify individual tests as needed during flight to provide more realistic, real time data.

First flight of the Boeing AAT was Jan. 25, 1989. In subsequent Phase I flight tests, the air crew encountered a ground based monopulse tracking radar, surface-to-air missile (SAM) radars and a modern airborne interceptor. The test program has also included flights at the Strategic Air Command's Strategic Training Range Complex. Additional missions include:

Naval Weapons Center, China Lake, Calif.--where the testbed will fly against simulated Soviet SAM radars;

Oceana Naval Air Station, Norfolk, Va., and the Electronic Combat Center, Mountain Home, Idaho--where the real time route planner and map-aided terrain following system will be tested.

The flight test program is expected to end in late 1990. Boeing Military Airplanes will continue with independent research and development, while preparing to support Department of Defense agencies with their future needs.

ENGINEERING INFORMATION SYSTEM PROTOTYPE

The Air Force's innovative Engineering Information System (EIS) project's detailed prototyping plans and timetable will be described in a workshop Nov. 13-16 in Orlando, Fla. The EIS project completed its critical design review milestone in August, and has entered into the program phase in which a working prototype will be developed and tested.

The EIS project, headquartered at Wright-Patterson Air Force Base in Ohio, is being designed to integrate electronically all of the information involved in the design and engineering management of major avionics systems. The EIS is being structured to make possible the insertion of new CAD systems into federations of existing computer-assisted engineering and administrative systems.

Last year, a Nov. 14-17 workshop in Baltimore provided industry participants the opportunity to recommend design enhancements that could assure the generality and flexibility that the EIS system will need in order to accommodate the full variety of CAD systems, workstations, databases, and other devices involved in engineering. The heterogeneity of the many component systems and subsystems introduces incompatibilities that must be resolved and managed through the EIS, so that there will be no obstacles to the interchange of data between these systems.

The EIS project has addressed the issue of homogeneity through the data abstraction facilities of the object oriented systems paradigm. The architecture of the EIS system is built around an Object Management System (OMS), which is a software kernel that manages all of the tools and databases in the EIS according to a uniform object-oriented mechanism for interchange. Facilities are provided through the OMS for defining and controlling objects, invoking functions on them, and supporting rule processing. The OMS keeps track of objects, where they are stored, what their attributes are, and coordinates the execution of functions on these objects. The OMS serves as the integrating hub for EIS functionality, and as the dispatcher of communications between systems and messages between objects.

The EIS system design includes a User Interface Management System (UIMS) to provide the integration of all the EIS capabilities in a seamless manner from the perspective of the engineer user. It provides the services for generating and managing consistent user interfaces, and is designed to support a wide variety of dialogue styles (menus, icons, forms, etc.). The UIMS provides an interface that will allow application tools to be written in a device- and dialogue-style-independent manner.

The Data Base and File system Adapters (DBFA) allow the EIS to use a wide variety of different database management systems, since these adapters unify the appearance, formats, and data types of all of these file systems and DBMS as they present themselves to the OMS. A "Service Lattice" provides a library of software components that can support a wide variety of different tasks, and a policies support service provides the common framework through which different organizations can tailor the EIS to fit their ways of doing engineering.

The workshop will be held at the Grenelefe Resort and Conference Center, Grenelefe, Fla. For information, contact Mark Goldfarb, Palisades Institute for Research Services, 2001 Crystal Drive, Suite 307, Arlington, VA 22202, 703/769-5588. For information on the EIS Program, contact Steve Clark of Honeywell, 612/782-7389.

New Technology

GREATER SUPPORT OF HDTV R&D URGED BY HILL CAUCUS & INDUSTRY

The bi-partisan HDTV Caucus last week joined a growing number of U.S. companies calling for swift and substantial federal support of the nascent HDTV industry. In an open letter to the president and Congress, the 31 Caucus members and over 100 industry CEOs urged Bush to lead a concerted HDTV initiative and to endorse the $100 million recommended by DARPA to match private industry investment.

Sen. Al Gore (D-Tenn.), one of the Caucus leaders, said, "High-definition television is vital to a strategy that claims a part of the future not just in home entertainment but in the electronics industry overall. Our competitors have such strategies; we don't and we're going to pay for it."

Caucus members stressed the implications for the defense industry of a failure to develop HDTV technology. They suggested that HDTV will drive R&D into 4 Mb dynamic random access memory (DRAM) chips, the next generation semiconductor. Presently, only four U.S. companies still make 1 Mb DRAMs: IBM, AT&T, Micron and Texas Instruments. Failure to encourage domestic HDTV production would, the group argues, cede control of the new 4 Mb DRAM market to foreign competitors. DRAMs are essential to most advanced defense systems.

The Department of Defense has also expressed interest in the improved display quality possible with HDTV. Defense applications for the flat, high-resolution monitors include target acquisition, electro-optical tracking, surveillance, and navigation.

...DARPA Names HDTV Contractor Teams

The $100 million recommended by DARPA is to fund an aggressive high-definition technology program in FY90. Presently DARPA still has $30 million of the funds authorized by Congress for FY89. Last week DARPA did select three contractor teams to develop processor technology as part of its High Definition Display program, but dollar value and duration of the contracts have not been finalized. The agency is somewhat hesitant to extend new research contracts and industry somewhat skeptical until the degree of future commitment is clear.

The three contractor teams are: David Sarnoff Research Center, Princeton, NJ with Sun Microsystems, Mountain View, Calif., and Texas Instruments, Dallas, (high-definition image work station); Adams Russell Electronics, Waltham, Mass., with MIT (advanced compression technology); and Qualcomm Inc., San Diego (alternative compression technology).

Dr. Robert Noyce, president and CEO of the Semiconductors Manufacturing Technology (SEMATECH) consortium, stated in testimony before the House Committee on Energy and Commerce that "as a businessman, I would not dream of entering such a high-risk, albeit a potentially high-return, arena (like HDTV) without a partnership such as the one that formed SEMATECH (where) government and industry share equally in the cost of our research and development."

SEMATECH is a non-profit R&D consortium composed of 14 U.S. semiconductor manufacturers and the DoD aimed at achieving global leadership in this market by 1993.

Groups investing in 4 Mb DRAM production, like U.S. Memories Inc., a for-profit private consortium that is hoping to raise $1 billion in start-up investment capital, are concerned that a U.S. lag in HDTV development will affect demand for their product.

Pat Hill Hubbard, vice president of Science and Technology Policy at the

American Electronics Association, in a speech before industry leaders, said, "The semiconductors used in televisions are much like those used in computers and, should the manufacture of HDTVs be overseas, it is likely production of the chips will move too. This could negatively impact both the commercial and defense aspects of our computer industry."

However, despite these impassioned industry admonitions, President Bush has become reluctant to throw the full weight of the government behind high-definition system development.

Commerce Secretary Robert Mosbacher early in his tenure testified to Congress that HDTV was a "top priority" but has since had to back pedal. The administration does not agree that high-definition system R&D is essentially basic R&D on next generation electronics and is now arguing that support of high-definition research would be selective meddling in the market.

THOMSON PLANS FULL-SCALE PRODUCTION OF FLAT LCD SCREENS

The Thomson group has decided to set up production capabilities to manufacture flat liquid crystal display (LCD) screens on an industrial scale. The flat LCD screens to be produced are based on technology developed by the company's Corbeville Research Laboratory, the Group's subsidiary Eurodisplay and General Electric in the United States.

A new subsidiary, Thomson-LCD, will be established to continue researching the technology and to manufacture the screens. Thomson-LCD will produce flat screens for avionics and defense systems, particularly those systems now manufactured by Sextant Avionique, the company recently formed by Thomson-CSF and Aerospatiale. Thomson-LCD will also manufacture flat high-definition screens for consumer products.

Small production runs of screens will be manufactured for Sextant Avionique's commercial and government customers. The same production lines will be used to manufacture screens on a pilot basis for consumer products.

Once the production facility has reached full industrial maturity, Thomson intends to launch the second phase: the construction of a mass production facility. The new plant will manufacture LCD screens for vide projection and direct viewing.

The combined capabilities of the group's professional electronics and consumer electronics divisions ensure that Thomson will be able to develop a full range of reliable and competitive products, combining avionics precision with consumer production efficiency, the company said.

Avionics Digest

*** ARMY ACCEPTS LAST TRI-SERVICE COMMUNICATION SWITCH.** GTE Government Systems Corp. has delivered to the Army the final unit of 51 electronic telecommunications switches for the tri-service tactical communication (TRI-TAC) program and has announced that a new version of the switch is already being manufactured. The original contract, administered by the Army Communication Electronics Command, Fort Monmouth, N.J., was valued at $130 million. The switches are compatible with a wide array of current hardware as well as the planned Mobile Subscriber Equipment, TRI-TAC subscribers, and communications secure equipment and transmission systems.

*** THIRD LAVI TO BE USED AS TECHNOLOGY TESTBED.** Israeli Aircraft Industries plans to use the third prototype of the Lavi fighter as an avionics testbed. Known as the B-3 technology testbed, the slightly modified version completed its first flight test earlier this month. The first two prototypes have been dismantled. Using internal R&D funds, IAI plans to use the B-3 to demonstrate the ability of the aircraft's avionics to support ground attack missions. IAI hopes to market the avionics packages for aircraft upgrades.

*** GALLIUM ARSENIDE, MMIC PRODUCE HAND-HELD GPS RECEIVER.** Magellan Systems Corp., (City, ST) has taken advantage of advances in integrated circuit technology to produce global positioning system receiver that is powered by six AA batteries. The 30-ounce unit indicates location in the military grid reference system as well as the universal transverse Mercator coordinates and standard latitude and longitude. Unit cost is $3,500.

*** ROCKWELL TO UPGRADE F-111D/F AVIONICS.** A Rockwell team headed by Autonetics Sensors and Aircraft Division, Anaheim, Calif., will modernize the avionics system on the F-111 D/F fighter bomber. The program, designated "Pacer Strike," is designed to improve aircraft reliability and maintainability, provide state-of-the-art navigation and weapon delivery capabilities, and to continue efforts to standardize the Air Force's F-111 fleet.

The 163 F-111Fs and Ds assigned to the tactical air forces will be modified under the terms of the $69 million contract, with options that could increase the total program value to more than $150 million if SAC's F/B-111s based in the U.K. are included. Upon assignment to TACAIR, the F/B-111 will be redesignated the F-111G.

*** AMP PROCEEDINGS AVAILABLE.** Proceedings from the First Automated Mission Planning (AMP) Requirements Symposium are now available to all those involved or interested in the field. While the contents of the volume are devoted primarily to the Air Force and Special Operations, much of the information has across-the-board application. AMP is the effort to take every factor involved with or impacting upon a combat mission planning, processing them simultaneously at very high speed, and producing the results (in whatever format required) in near real time. The object is mission success at low cost in lives and equipment.

The cost of the Proceedings is $85. Send a check or purchase order to AEF-NJ, POB 351, Palmyra, NJ 08065.

*** LTV PERFORMING UPGRADE FOR A-7 AIRCRAFT.** LTV Aircraft Products Group has received a contract worth approximately $4 million from the U.S. Air Force for AIM-9L avionics upgrade kits for three squadron of A-7 aircraft. The modification will allow the Air National Guard A-7 pilots to fire the AIM-9L missile without having to maneuver the aircraft to point directly at the target. This new capability is designed to enhance the survivability of the A-7 in a combat environment. This is the third in a series of LTV-performed avionics upgrades for the Guard's A-7 fleet. The LANA upgrade, which gives pilots low altitude navigation capability at night, was completed earlier this year. Currently in process is the Replacement Inertial Measurement Systems (RIMS) upgrade which upgrades the A-7's existing ASN-90 Inertial Measurement System with a state-of-the-art navigation system.

*** HUGHES TO ACQUIRE ELECTRO-OPTICS UNIT FROM PERKIN-ELMER.** Hughes Aircraft Co., a unit of GM Hughes Electronics, and the Perkin-Elmer Corp. have signed an agreement whereby Hughes will purchase Perkin-Elmer's Electro-Optics Technology Division (EOTD), one of the country's leading providers of electro-optical systems for systems for specialized scientific and military applications. Terms of the agreement were not disclosed.

Located in Danbury, Conn., Perkin-Elmer employs approximately 800 people. The division built the Optical Telescope Assembly and fine guidance system for NASA's Hubble Space Telescope, scheduled for launch aboard the space shuttle in 1990. It also participates in several space science activities, such as the Advanced X-ray Astrophysics Facility, strategic optical technology programs, and tactical government programs such as the production of laser warning receivers.

Budget

NAVY END RUNS FOR ASPJ AWARDS: CONGRESS WANT TO KNOW WHY

Between the Senate approval of an amendment by Senators David Pryor (D-Ark.) and Charles Grassley (R-Iowa) to put a hold on production of a $4.8 billion airborne radar jamming system until it undergoes additional testing and the overall military appropriations bill still in conference, the Pentagon moved swiftly to make two awards totaling more than $400 million to build 100 units of the Airborne Self-Protection Jammer System (ASPJ).

Both Pryor and Grassley told Defense Secretary Richard Cheney last month (Oct. 12) that "Signing these contracts before the Senate House conference had begun seems to end run the appropriations process."

Already both Pryor and Grassley were concerned that the Pentagon was trying to rush "a seriously flawed $4.8 billion weapons system" into production before Congress could take action. Said Pryor in late September: "My amendment will put this troubled program on hold until its bugs can be worked out" (AVIONICS REPORT, Oct. 20).

But the Navy went ahead, Pryor's assistant Damen Thompson said, and awarded two contracts Oct. 6, one for $203.7 million to Westinghouse Electric and a second for $213.3 million to ITT Avionics--to build 100 units of the ASPJ.

Pryor had previously obtained Navy test results which showed that the ASPJ failed several operational tests igniting the request which resulted with the Senate Appropriations Committee including language in its report (accompanying the defense spending bill) which directed that ASPJ production not begin until additional tests were conducted.

Pryor and Grassley told the Defense secretary, "We believe that awarding the contracts was an impolitic action that demonstrated bad procurement policy and could weaken relations with the committees of jurisdiction and the Congress."

"We urge you to review these awards and to take appropriate actions to slow-action on the ASPJ and give Congress and your Inspector General time to act on this issue."

Pryor's assistant last week told Avionics Report that "We made our feelings clear and we'll leave it to the Secretary [Cheney] to do likewise."

Contracts

NAVY WORKING ON ADVANCED AVIONICS ARCHITECTURES

The Naval Avionics Center is seeking contractors to provide a testplan report for advanced avionics architecture studies for next-generation aircraft. The architecture will be based on the concept of pooling common, reconfiguration modules interconnected by standardized busses such as the PI- and high-speed data busses. The test plan will allow for a comparison evaluation of various high-speed data bus technologies. Contact: The Naval Avionics Center, 600 21st Street, Indianapolis, Ind. 46219-2189, attn. Alan Impicciche, Call C. Williams Borders, 317/353-3623, due Nov. 22, 1989.

Sincerely,

The Editors

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Dear Executive:

COMMERCIAL TILT ROTOR COULD RESULT FROM OSPREY BATTLE

With the V-22 Osprey program continuing design work through December, it's almost certain that congressional interest will keep the revolutionary tilt rotor alive at least through fiscal year 1991, observers say.

This will permit the V-22 to demonstrate its worth in the flight test program and allow the secretary of defense "to more comprehensively analyze the cost effectiveness of the V-22 vis-a-vis alternatives," according to the House Armed Services Committee.

At the same time, there is a renewed interest on Capitol Hill that rather than writing off the $2.5 billion already spent on the Osprey, the government would provide the several hundred million dollars necessary to develop a commercial tilt rotor.

Top specialists from Bell Helicopter Textron and Boeing Helicopters have recently urged a tilt rotor joint office for infrastructure development and for communication with cities, manufacturers, operators and the Congress.

Robert Mackinnon, former president of Aerospatiale Helicopter Corp., Grand Prairie, Texas, told HELICOPTER NEWS in an interview that all of the political problems aside, "the technology has advanced to the point where a commercial V-22 is a fact. It's just a matter of when."

Mackinnon, now a helicopter consultant, made it clear that commercial tilt rotor developments in Europe "are a natural." Indeed, retired General Richard Sweet, also a helicopter consultant, told us, "If you carry 75 passengers in an economical payload throughout the major cities, you'll change the whole transportation picture in Europe."

The advantage in Europe for an aircraft that takes off and lands like a helicopter and flies like an airplane is a subject that has most Europeans buzzing in the face of time-consuming commuting and restrictive congestion in

● Marine Corps Says V-22 Almost 1,000 Pounds Overweight....................3
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the major airports. In fact, it was a U.S. commercial V-22 system--anticipated by Europeans as early as 1995--that sparked France's Aerospatiale to come up with an urgent initiative driving EUROFAR's formation because Europeans think the tilt rotor will conquer Europe.

While Europe's aircraft operators fight for access to airports and airspace, their corporate leaders see full-scale tilt rotor development in the United States as a real threat.

EUROFAR's helicopter manufacturers--Aerospatiale, MBB, Agusta and Westland --and its aircraft makers including Italy's Aeritalia, the United Kingdom's British Aerospace and Spain's Casa, have asked their governments to provide 75 percent of the funding through EUREKA with the companies providing the remaining 25 percent.

Pilot studies for EUROFAR will be completed by January 1991, and the program's civil-only status is likely to change since it takes an altogether more profitable dimension if it is expanded to include military applications.

In the United States, at least 16 states have studies under way to examine the efficiency and savings in commercial tilt rotor development.

In recent weeks, the Electronic Industries Association called civilian tilt rotor system development one of the biggest DoD growth areas in its analysis of commercial applications of Defense Department spending.

...FAA Lays the Groundwork for Commercial Tilt Rotor

Realizing that civil tilt rotors offer significant capabilities to alleviate the problems of airport congestion, travel to airports and excessive passenger levels, the FAA has embarked on extensive programs to create the infrastructure that will be necessary.

The FAA goals are to be able to grant provisional certification to a version of the V-22 by December 1992 and full certification of a civil tilt rotor by late 1995.

An agreement between the FAA and the Defense Department now enables the FAA to reap the benefits of the military flight test program for the V-22. Also, the FAA is continuing its accelerated programs to finalize the standards for tilt rotor certification, to develop the tilt rotor airspace control system, and to establish pilot training criteria.

A special project office has been established within the FAA headquarters which is responsible for focusing exclusively on tilt rotor matters. It acts as the central coordinating point to oversee the development of the national tilt rotor transportation system.

These steps and more are moving forward to ensure that commercial aviation infrastructure is developed which will result in the rapid assimilation of civil tilt rotor aircraft during the mid-1990s.

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22 Osprey

MARINE CORPS SAYS V-22 ABOUT 1000 POUNDS OVERWEIGHT

The Marine Corp "is looking at 15 percent weight growth over what the contractor thinks he can make now" in the V-22 test development aircraft, according to Col. James Schaeffer. The V-22 program official said that the contractor has guaranteed it will meet the weight requirement of 31,800 pounds, although the aircraft currently weighs about 32,500 pounds, "or about 1,000 pounds overweight."

Schaeffer noted that the full-scale development aircraft is not representative of the production aircraft. He added that the service feels the Bell/Boeing team can meet the weight requirement between the third to eighth aircraft coming off the flight line.

Schaeffer also said the weight issue is not as big as the service thought it would be a year ago.

Noting that another drawback in the V-22's development is the software to integrate the fly-by-wire flight controls, Schaeffer pointed out that the contractor support for this has been excellent.

Commenting on wind tunnel tests for the V-22, Schaeffer said "that the aircraft is proving itself to be pretty much true to form to what the wind tunnel tests said the aircraft will do compared to the dynamic laws of flight that the aircraft is actually performing."

Concerning the aircraft's multi-functional displays, Schaeffer said this is also a concern because with all the "equipment we pass through there, what the actual display does as you make the input is somewhat retarded...we're talking megaseconds and a half-second sometimes in the worst case." He added that "we have two good work-arounds to make good inputs;" to make sure the displays are more reactive to the data coming in.

Army

McDONNELL DOUGLAS/IBM TEAM FOR ARMY CONTRACT

McDonnell Douglas and IBM Systems Integration Division intend to form an industry team to compete for the U.S. Army's $30 million, 4-year Day/Night Adverse Weather Pilotage System (D/NAPS) development contract.

The major area of focus for D/NAPS will be development of pilot cognitive decision aids using artificial intelligence. The program will include manned simulations and flight demonstrations of the integration of advanced technology in sensors, computing methods, flight controls and cockpit displays to maximize combat helicopter mission effectiveness and survivability in day, night and in adverse weather.

Both McDonnell Douglas Helicopter Co. and IBM were prime contractors on the Advanced Rotorcraft Technology Integration (ARTI) program, which developed and evaluated a fully integrated and automated single pilot crew station in full-mission simulation.

McDonnell Douglas developed and flight-tested an automatic digital flight control system for the AH-64A Apache. IBM has begun integration of Special Operations Aircraft (SOA) avionics for the MH-60K Blackhawk and MH-47E Chinook aircraft and is the prime contractor for the U.S. Air Force Real-Time Artificial Intelligence Processor Contract.

McDonnell Douglas, through its McDonnell-Aircraft Co. component, is the prime contractor for the Defense Advanced Research Projects Agency (DARPA)/U.S. Air Force Pilot's Associate program.

D/NAPS is an important element of the U.S. Army's Rotorcraft Pilot's Associate program.

LHX

EUROPEANS MUST SIGN-ON LHX WITHIN A YEAR--SUPER TEAM

In order for European firms to participate in the Army's $40 billion Light Helicopter Experimental (LHX) program, government-to-government Memorandums of Understanding (MOUs) must be signed within the next year, according to Allan Haggerty, LHX program manager for the competing Bell/McDonnell Douglas "Super Team."

Haggerty noted that as the program moves ahead (it is currently one year into the 23-month demonstration/validation phase), the business arrangements of how European firms would integrate into the LHX program become ever more complex.

He added that as U.S. firms continue to invest in the LHX program (roughly $500 million to-date from both contractor teams and another $500 million from the government) through dem/val, and the design becomes more solidified, it appears unlikely that European firms will play a role in the program "unless there is a clear business advantage where the allied nations can bring a market of 400-700 additional aircraft so that a workshare split would not adversely impact the return on investment of the (U.S.) subcontractors and major teammates... So that is a difficult issue and the longer it takes (to resolve) the more difficult it becomes."

The government must take the lead on this issue, Haggerty observed, and develop MOUs with NATO countries in order to allow "more sophisticated technologies to be introduced" into the discussion. One scenario, Haggerty envisioned, would involve completing the downselect process at the end of dem/val and then asking the winning LHX team "to collaborate with the selected nations that have achieved MOU with the U.S. government."

...Transition Has Delayed Action On European Participation

Presently, DoD has squandered about a year of time, as the issue of European participation in LHX has drifted during the transfer of administrations. Both LHX program manager Maj. Gen. Ronald Andreson and former Army Undersecretary Michael Stone visited a number of European firms in the early fall of 1988 (principally those involved in the LAH and PAH-2 programs) and Stone made a number of recommendations, but refrained from implementing them so as not to constrain his successor's options. The issue lagged in DoD, Haggerty explained, "because in the change of administrations several of the key slots in the Army were not filled during most of this year."

The key issue regarding technological cooperation involves restrictions on the transfer of sensitive technologies, and DoD has issued some preliminary guidelines, Haggerty added. The Army is allowing LHX contractors to discuss "conventional technologies" with interested European firms, Haggerty said, but the more "exotic technologies" are still off-limits.

However, with the outlook of constrained defense budgets, the Army is reassessing international collaboration "on all Army weapons systems and particularly in aviation," Haggerty said, including an assessment of "how to share the large non-recurring development costs of the new weapons. It just makes good economic sense to try to collaborate."

The chief stumbling block in terms of European participation, he noted, is in "requirements rationalization; trying to get the military proponents in the various countries to blend together their requirements into a common specification." However, allied cooperation cannot, from the Army's perspective, be allowed to interfere with the LHX's development or deployment schedule, the Super Team official said.

In viewing the European technological landscape, NATO nations have some "very interesting mission equipment technologies that

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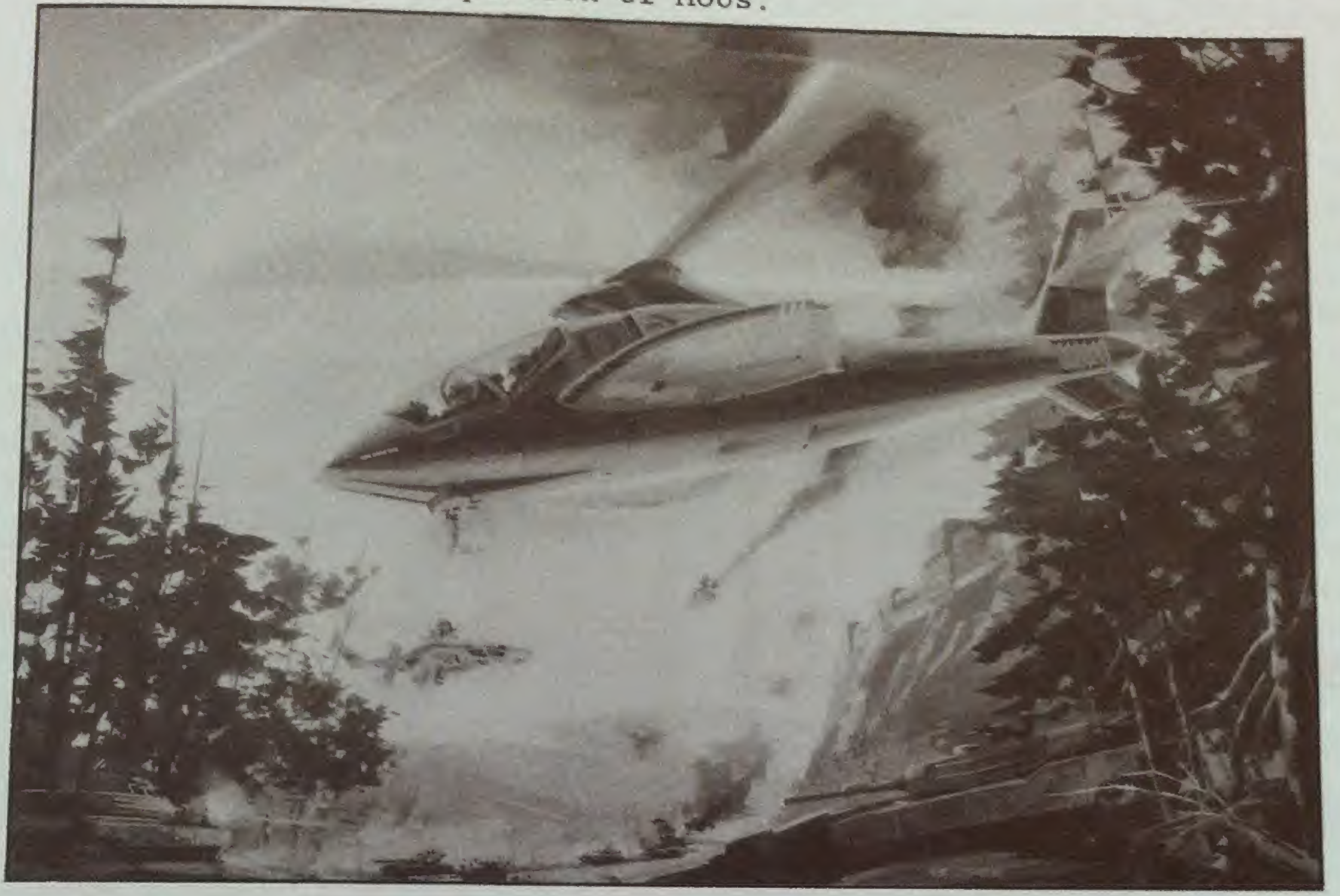
rotor technologies, composites, automatic survivability equipment and drive systems, he noted. In terms of weapon systems, Haggerty noted that the French Mistral and the Short Brothers-developed Starstreak are also good systems.

One method for avoiding the one-year limit for concluding MOUs imposed by the December 1990 conclusion of dem/val, Haggerty outlined, could involve an LHX helicopter jointly produced with the allied nations but equipped with a European Mission Equipment Package (MEP). Such an approach would occur later into the production cycle of the U.S. LHX program, and would not place as much emphasis upon the timely completion of MOUs.



FOREIGN INVOLVEMENT IN LHX NOT SEEN UNTIL AFTER FSD

Foreign participation in the Army's LHX helicopter program is not envisioned until after the service has made the downselect from among the two competing contractor teams to enter into full-scale development (FSD), according to LHX program manager Maj. Gen. Ronald Andreson.

However, U.S. industry believes foreign firms must be on-board a contractor team before an FSD downselect is made in December 1990. LHX officials from the competing Bell/McDonnell Douglas team said last week that if U.S. firms are making substantial initial investments in the program, it would seem unlikely that foreign firms will have easy admission to the program at such a late date.

Andreson noted that foreign firms are reluctant to join the program at present for a number of reasons. Chief among these is uncertainty over the program's future funding status in Congress (although the program emerged relatively unscathed from the recent budget deliberations with its $241 million request intact), the general noted.

He also said that fear of joining the losing LHX team, concerns over third party sales and technology transfer restrictions are also issues which need to be addressed.

Acknowledging that the technology transfer issue is a major stumbling block to eventual European participation in the LHX program, Andreson called for "high level impetus" to government-to-government talks to spur cooperation between the LHX, Franco-German PAH-2 and multi-nation LAH helicopter programs. The general also noted that other U.S. allies--like Israel, South Korea, Japan and Canada--should be involved in the talks as well.

HELICOPTER RESALE TRENDS

Make/Model	Percent of appreciation January - October 1989
Sikorsky S-58	19-27%
Aerospatiale SA-315B Lama	16-24%
MBB BO-205CBS Twin Jet III	9-21%
AHC SA-3160/SA-316B Alouette III	16- 19%
Bell 206B JetRanger II	11-19%
Sikorsky S-61N	15-18%
Bell 206L- 1 LongRanger II	17-10%
Bell 206L LongRanger	16-17%
Agusta 109A	5- 17%
Bell 206A JetRanger	12-15%
MBB BO-105CB Twin Jet	10-15%
MBB BO-105C/CS	10-14%
Aerospatiale SA-316B Alouette III	12-13%
Hughes 269A	8-13%
Hughes 269B	7-12%
Sikorsky S-76/S-76 Mark II	10- 12%
Schweizer 300C	12- 0%
Aerospatiale SA-365N Dauphin 2	10- 11%
McDonnell Douglas MD 500C	11- 9%

Make/Model	Percent of appreciation January - October 1989
MBB BK-117 Space Ship	11- 7%
Bell 212	11- 6%
Aerospatiale AS-355F TwinStar	8- 10%
Aerospatiale AS-350D AStar	9- 8%
Aerospatiale AS-350B Ecureuil	8- 7%
Bell 206B III JetRanger III	6- 8%
McDonnell Douglas MD 500	6- 8%
Sikorsky S-58T	6- 8%
Bell 222B	2- 8%
Aerospatiale SA- 341G Gazelle	7- 7%
McDonnell Douglas MD 500D	6- 7%
Bell 206L-3 LongRanger III	6- 7%
Bell 222UT	2- 6%
Hughes 300C	3- 5%
Agusta 109A Mark II Widebody	2- 5%
Bell 412	1- 5%
Sikorsky S-76B	3- 3%
Bell 205A-1	2- 2%

Source: Helicopter Blue Book

HUGHES AND AEROSPATIALE TEAM FOR INTEGRATED TRAINING SYSTEM

Hughes Training System Inc. and Aerospatiale Helicopter Corp. have formed a team to compete for the U.S. Army's Initial Entry Rotary Wing Integrated Training System (IERW ITS) program.

Under its teaming arrangement for the planned IERW ITS, Hughes will serve as prime contractor and develop the integrated training system--simulators, training devices, management system and courseware, and provide logistics support maintenance and all instruction except for combat skills.

Aerospatiale's AS 350B, which meets all IERW aircraft specifications as outlined in the program's draft request for proposal, is ready for immediate delivery to the Army to replace the UH-1. The AS 350B has set new standards for low maintenance and simplified components, which contribute to cost-effective operations.

Aerospatiale will produce and deliver its AS 350B helicopter to replace the existing trainer aircraft, the UH-1 Iroquois.

Operated from the Army Aviation Center in Fort Rucker, Ala., the IERW ITS would cost some $500 million over five years but would save the government some $5 million per month in maintenance costs, according to Aerospatiale Vice President Greg Plechus.

In an interview with HELICOPTER NEWS, Plechus said that the AS 350B has one-third the operating costs of the UH-1. "With 2,000 students a year being trained during 200,000 flight hours per year at over $450 per hour in maintenance costs, that's a savings of $5 million per month," Plechus said.

The other four competitors include McDonnell Douglas Helicopter Co.; Imagineering, Irving, Texas, teamed with Bell Helicopter, Global Helicopter Technology Inc., Systems and Simulation Inc., Texas Avionics and Perot Systems Corp.; CAE-Link teamed with Enstrom Helicopter and Beech Aerospace Services; and Flight Safety International teamed with Schweizer Aircraft.

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Business

TECHNOLOGY LICENSING OPPORTUNITIES

A number of technology developments for more effective helicopter control, testing and analysis have been accomplished recently at government agencies and are available to commercial companies for licensing opportunities, HELICOPTER NEWS has learned.

These technology licensing opportunities include a simulating instrument for helicopter takeoffs and landings, tests of helicopter control systems and simulations of unpowered helicopter landings.

...Simulating Instrument for Helicopter Takeoffs and Landings

Since current approved terminal instrument procedures (TERPS) for helicopters apply only to airports having standard instrument landing system equipment, new TERPS are needed for such nonstandard landing sites as oil rigs, the tops of buildings and mountains, according to Ames Research Center engineers Anil V. Phatak and John A. Sorensen.

Their report, which was recently released, reviews current methods for the evaluation of TERPS and discusses the feasibility, benefits and liabilities of substituting electronically controlled flight-simulation equipment for flight tests.

More information may be found in NASA CR-177408 report ($12.50) entitled "Evaluation of the Usefulness of Various Simulation Technology Options for TERP's Enhancement." (See bottom of this page for address and phone number.) For inquiries regarding commercial use of the patent, refer to ARC-11813/TN.

...Tests of Helicopter Control System

Modifications to the CH-47B by engineers at Ames Research Center have led to the development of highly augmented, high-gain flight control systems to assist pilots in the performance of demanding tasks and to improve the handling qualities of the aircraft.

The explicit model chosen for flight tests required modifications that gave the control system high-bandwidth control and excellent performance in flight, according to Ames Research Center researchers Kathryn B. Hilbert and J. Victor Lebacza and Stanford University's William S. Hindson.

In their report, the researchers said: "The frequency and damping characteristics of the helicopter motions followed those of the model almost perfectly."

Inquiries concerning rights for the commercial use of this invention should refer to ARC-11761/TN.

...Simulation of Unpowered Helicopter Landings

Sensory cues are important in the simulation of emergencies, and Ames Research Center researchers have presented the results of their automation experiment that shows high fidelity motion cues to improve pilot performance in helicopter landings without engine power.

Research specialist engineers William A. Decker, Charles F. Adam and Ronald M. Gerdes explain, "The automation experiment was conducted in the vertical-motion simulator at Ames with experienced pilots as the subjects."

Inquiries regarding commercial rights to the invention should refer to ARC-11715-TN.

All inquiries and information regarding the reports should be addressed to Patent Counsel Darrell G. Brekke, Mail Code 200-11, Moffett Field, CA 94035, 415/694-5104.

Contracts

SABRELINER WINS MAJOR ARMY HELICOPTER ENGINE CONTRACT

The Army Aviation Systems Command (AVSCOM) in St. Louis has awarded both halves of the competitive T53 Engine Rebuild Program contract to St. Louis-based Sabreliner Corp.

The initial value of the contract is $14.6 million, one of the largest made by AVSCOM in which a small business has won both the small business set aside and the unrestricted portion of the contract.

The contract to rebuild the turboshaft engines for the UH-1 "Huey" helicopter was split equally between a U.S. small-business set aside and an unrestricted worldwide competition. Sabreliner competed with four small businesses for that portion of the contract and with six major defense contractors, including foreign companies, in the open competition. Fifty-five contractors responded initially to the Army's solicitation for bids.

"This is a milestone for Sabreliner Corp. because it is rare for a small aerospace company to be able to capture both the small business and unrestricted portions of a split-procurement contract," said F. Holmes Lamoreux, chairman and chief executive officer.

The contract calls for Sabreliner Corp. to begin rebuilding and testing a total of 100 engines for the first-year order. The contract has second- and third-year options, which can result in a total of 400 engines.

...Contract Potentially Worth $58 Million

The contract is potentially worth $58 million in business for Sabreliner and its teaming partner, Gary Aerospace Inc. of Hondo, Texas. Gary Aerospace has experience in overhauling the T53 and will perform a significant portion of the work. This is the third major government contract Sabreliner has won this year in which it has teamed with a specialized aerospace firm to successfully compete for a contract.

Announcement by AVSCOM that Sabreliner won the contract comes only a few weeks after Sabreliner was awarded a $15.6 million Air Force contract for the initial, non-recurring phase of extending the life of Cessna T-37B training aircraft. Sabreliner has won six consecutive competitive government contracts in 1989, worth more than $43 million. Multi-year procurement options under these contracts provide more than $150 million in potential government business.

A major portion of the T53 engine work will be done at Sabreliner's maintenance and modification center at Perryville, Mo. Sabreliner currently is constructing a new $600,000 engine test facility at Perryville, designed to test a variety of commercial and military turboshaft and turbojet engines. It includes a water brake to measure shaft horsepower on turboshaft engines.

The test cell will be fully automated to instantly calculate and report engine performance data. It was designed jointly by Sabreliner and Turbo-Motive Inc., of Camden, Conn. Sabreliner will have the first non-military test cell to feature Howell Instruments' AEDATS, an automated engine data acquisition test system.

Sincerely,

The Editors

Daniel Casolaro, Special Editor
Ed Hazelwood, Managing Editor

P.S. Get the complete details on the future of the U.S. and foreign civil helicopter market . . . FREE! See the enclosed flyer for more details.

Budget

NAVY END RUNS FOR ASPJ AWARDS: CONGRESS WANT TO KNOW WHY

Between the Senate approval of an amendment by Senators David Pryor (D-Ark.) and Charles Grassley (R-Iowa) to put a hold on production of a $4.8 billion airborne radar jamming system until it undergoes additional testing and the overall military appropriations bill still in conference, the Pentagon moved swiftly to make two awards totaling more than $400 million to build 100 units of the Airborne Self-Protection Jammer System (ASPJ).

Both Pryor and Grassley told Defense Secretary Richard Cheney last month (Oct. 12) that "Signing these contracts before the Senate House conference had begun seems to end run the appropriations process."

Already both Pryor and Grassley were concerned that the Pentagon was trying to rush "a seriously flawed $4.8 billion weapons system" into production before Congress could take action. Said Pryor in late September: "My amendment will put this troubled program on hold until its bugs can be worked out" (AVIONICS REPORT, Oct. 20).

But the Navy went ahead, Pryor's assistant Damen Thompson said, and awarded two contracts Oct. 6, one for $203.7 million to Westinghouse Electric and a second for $213.3 million to ITT Avionics--to build 100 units of the ASPJ.

Pryor had previously obtained Navy test results which showed that the ASPJ failed several operational tests igniting the request which resulted with the Senate Appropriations Committee including language in its report (accompanying the defense spending bill) which directed that ASPJ production not begin until additional tests were conducted.

Pryor and Grassley told the Defense secretary, "We believe that awarding the contracts was an impolitic action that demonstrated bad procurement policy and could weaken relations with the committees of jurisdiction and the Congress."

"We urge you to review these awards and to take appropriate actions to slow-action on the ASPJ and give Congress and your Inspector General time to act on this issue."

Pryor's assistant last week told Avionics Report that "We made our feelings clear and we'll leave it to the Secretary [Cheney] to do likewise."

Contracts

NAVY WORKING ON ADVANCED AVIONICS ARCHITECTURES

The Naval Avionics Center is seeking contractors to provide a testplan report for advanced avionics architecture studies for next-generation aircraft. The architecture will be based on the concept of pooling common, reconfiguration modules interconnected by standardized busses such as the PI- and high-speed data busses. The test plan will allow for a comparison evaluation of various high-speed data bus technologies. Contact: The Naval Avionics Center, 600 21st Street, Indianapolis, Ind. 46219-2189, attn. Alan Impicciche, Call C. Williams Borders, 317/353-3623, due Nov. 22, 1989.

Sincerely,

The Editors

Glenn Hecton, Associate Editor
Daniel Casolaro, Special Editor

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Avionics — Nov 3 →
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Dear Executive:

AEROSPATIALE TO ACQUIRE MBB'S HELICOPTER UNIT WITHIN MONTH

(Redhill Aerodrome, England). Aerospatiale, the multi-dimensional French aerospace firm, is expected to acquire Messerschmitt-Bolkow-Blohm's (MBB) helicopter operations within the next month, industry sources told HELICOPTER NEWS at the recent Helitech-89 show here.

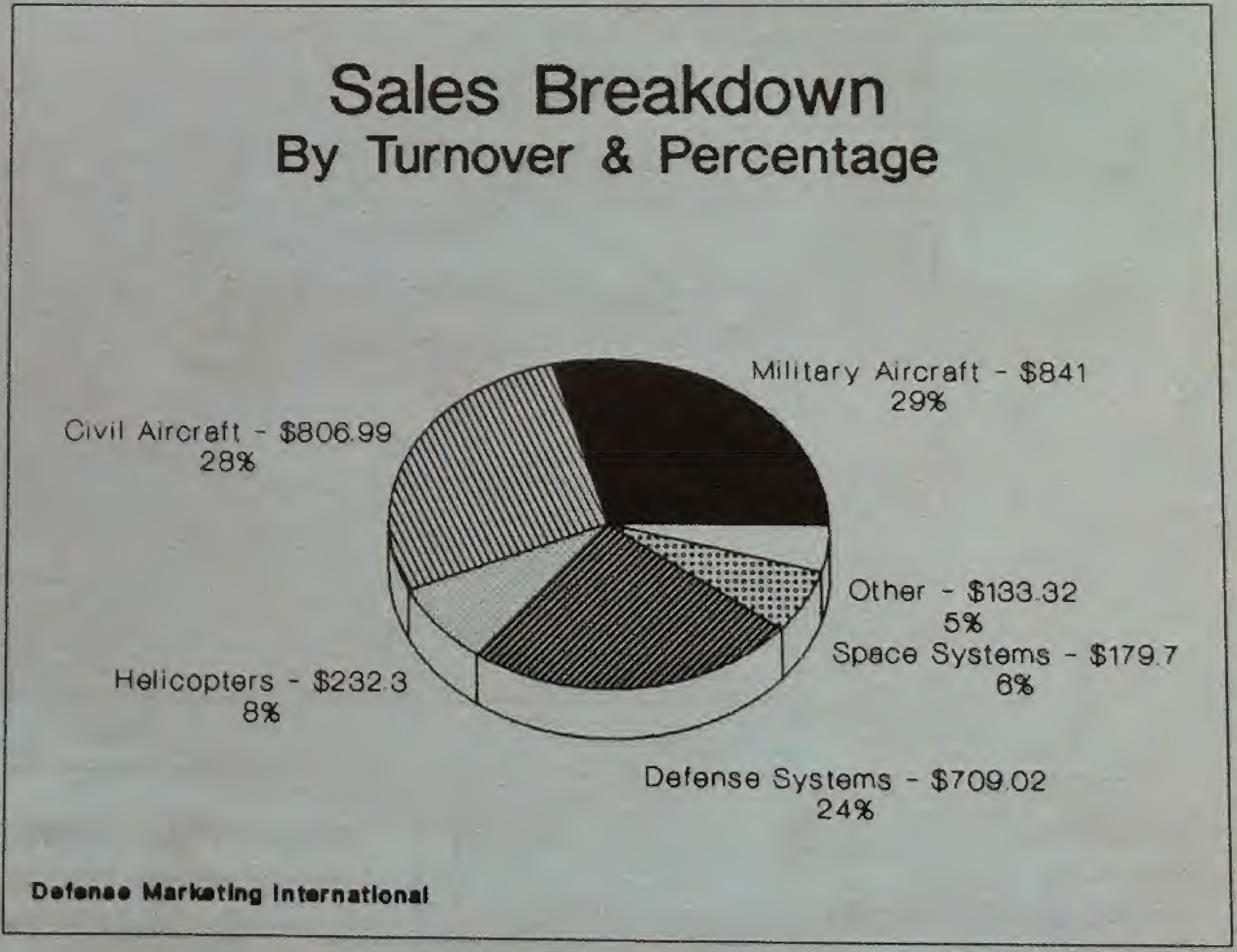
Aerospatiale, which is a partner with MBB in developing the future PAH-2/HAC/HAP helicopter, has been keenly interested in such a merger for the last several years. The source noted that Daimler Benz's recent acquisition of MBB has opened the way for Aerospatiale to assume control of MBB's helicopter unit. According to the industry official, MBB's helicopter subsidiary is unwanted by Daimler, which wants to focus instead upon missiles, engines and space systems within its newly created Deutsche Aerospace subsidiary.

Since MBB has only two helicopters in production at present, the BO 105 and the BK 117, the merger with Aerospatiale should proceed relatively smoothly, the official added. MBB's helicopter unit posted sales of $232.3 million in 1988, accounting for eight percent of MBB's total sales.

MBB'S CORPORATE PROFILE:

German Headquarters
P.O. Box 801109
8000 Munich 80
Fed. Rep. of Germany
Phone: (089) 6000-0

Turnover:	$3.08 billion
Total Assets/ Capital:	$3.17 billion
Total Output:	$3.19 billion
Investments:	$209.07 million
Employees:	38,456



Foreign Subsidiaries:

MBB Helicopter, Westchester, Pa.
MBB Helicopter Systems Ltd., London, England
MBB of America Inc., city of Dover, Del.
MBB Helicopter Canada Ltd., Fort Erie, Ontario

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LITEF ACCELERATING WORK ON FIBER OPTIC GYRO/SLATED FOR PAH-2

(Redhill Aerodrome, England). LITEF Gmbh, a West German subsidiary of Litton Inc., is accelerating work on its revolutionary fiber optic gyro, a company official told HELICOPTER NEWS at the Helitech-89 show.

Although first flight-tested in April of this year aboard a Dornier DO-228 aircraft at LITEF's test facilities in Braunschweig, West Germany, the official noted that current R&D efforts are focused on reducing the size of the fiber optic gyro. To achieve complete four axis control, four fiber optic gyros are mounted at right angles in a housing unit that comprises the system, he added.

LITEF is concentrating on developing the new gyro for deployment aboard the future Franco-German PAH-2/HAC/HAP helicopter, the official said. The PAH-2 is expected to be deployed in the 1994-96 time-frame.

According to LITEF, it has proposed to Eurocopter (the consortium developing the PAH-2) that it develop an interchangeable fiber optic strap-down attitude/heading reference system (AHRS) with company funds in conjunction with the development of a navigation system using the already produced LITEF K-273 magnetic gyroscope. Such an approach is no-risk, the official noted, since it would enable both the FRG and France to have available the most modern gyro technology at the start of production of the PAH-2, without risk to either the Eurocopter consortium or the governments.

LITEF may also propose the fiber optic gyro as a future addition to the European Fighter Aircraft (EFA), but is not making it a priority, the official explained. Honeywell, which dominates the ring laser gyro market, has also launched a fiber optic gyro R&D project, he added.

BRISTOW/EEL TO PROVIDE FLOTATION SYSTEMS TO KOREA

(Redhill Aerodrome, England). Bristow Helicopters and EEL (Westland Aerospace) have been awarded a contract to provide five complete emergency flotation systems for Bell-produced UH-1H helicopters by the South Korean Navy, company officials say. First delivery will be made in 1990, and the contract holds an option for an additional 20 flotation kits. The new systems "considerably enhance the safety" of the Korean UH-1H helicopters in performing maritime duties, Bristow officials noted.

They added that, historically, the UH-1H has never had a satisfactory flotation system on a level with that for the UN-1N. In the past, UH-1H users were often forced to affix pontoon type floats to their helicopter with attendant weight and speed penalties, the officials explained. Bristow/EEL officials noted that their flotation systems have already been installed on UH-1H/Bell 205 models operating in Great Britain, Saudi Arabia and Australia, and has accumulated over four years and 20,000 hours of "trouble-free service in the harshest of world environments."

SEXTANT OFFERING NEW COCKPIT PANEL FOR HELICOPTERS

(Redhill Aerodrome, England). The recently established French avionics consortium, Sextant Avionique, is seeking to market an advanced cockpit panel for medium-weight helicopters, company officials explained at Helitech-89.

In describing its new cockpit panel, Sextant officials noted that it consists of four high-technology head-down displays (SMD-66). Two of the displays, according to Sextant, the Primary Flight Displays (PFD) and the Navigation Display (ND), can be operated through a single Command Display Unit (CDU) by either the pilot or co-pilot. The displays also provide the crews with video images, depending upon the sensors aboard the aircraft (cartography, infra-red, low-light level), the officials said, noting that any symbology can be superimposed on the video.

According to Sextant officials, the new SMD 66 cockpit display system "is an outstanding improvement in helicopter cockpit panel design..."

February 9, 1989

LIST OF ALL COMPUTER EQUIPMENT AND ACCESSORIES

1. Personal Computers

   A. IBM AT
      30 Meg Hard Drive 640K
   B. (2) IBM PS2 - Model

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Memory Size - 19KB
2 CPU's
1 DPU

1st CPU: 1 MXE Board
3 MXD Boards
16 CRT's
Printer Controller Board
TC Board (controller for 2228B)
Mux to 2275 MUX Master in CPU #2 (disk controller)

2nd CPU: 2 MXE Boards
3 MXD Boards
12 CRT's
2275 Mux Master and Disk Controller

4. Additional Equipment for Wang

   1. Centronics Linewriter 400 Printer
   2. (1) Buffalo Printer Buffer - 1 Meg Memory
   3. (1) A/B Box
   4. (2) Racal-Vadic Model VA3451 Modems
      Asynchronous or synchronous (at lower speeds)
   5. (1) Universal Data System Model 201C Modem
      and Model 801 A/C Auto Dialer

February 9, 1989

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1. Personal Computers

A. IBM AT
   30 Meg Hard Drive   640K
B. (2) IBM PS2 - Model 30
C. (2) Epson Equity 11
   40 Meg Hard Drive, 1.2 Floppy & 3 1/2 Drive

2. Printers

A. (2) IBM Proprinters
B. (1) IBM Proprinter II
C. 3 NLQ's
D. 1 NLQ Wide Carriage
E. 1 NEC P6

3. Wang Computer Equipment

2280 MVP - F/R Cartridge Disk (Phoenix Drive)
Memory Size - 19KB
2 CPU's
1 DPU

1st CPU: 1 MXE Board
3 MXD Boards
16 CRT's
Printer Controller Board
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Helicopter Consultant

General Sweet, Ret.
Richard
apt office metro 870-4110

in Swan Point
259-4676

Blind Man's Bluff.

Whole Helicopter Industry In Transition – Huge!

Boeing Jet Donna Milhous (206) 865-2260

VP

Fire Explosion Suppression System for M1.
Use of Haylon

Global Helicopter in Texas.
Grand Prairie
Clem Bailey.

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Bob McKinnon
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Robert N.

Fuse Business for Kodak.

President.
Clem Bailey
former chief pilot at Bell. Test

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Training models
adaptation –
Bill

Marketing.

If you look around the world, the high tech birds are losing their funding.

fleet of birds around –

by adding Danny

fight + argue
US + Soviets agreement will limit the military advanced –

Consortium – British Boeing already

Big Used Helicopter Market
Taking – more versatile

Global can take the A Model 58 – reengineering – extend the boom, build up gear box, change the engine

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Existing Technology
Not high Risk.

Take a
and dramatically change their performance

LHXs are going to have a very tough time

money isn't there.

"I trained on 5 different aircraft in 11 months."

French.

The most * affordability training — - one bird - through school.

+

Too many different aircraft in training establishment

Costly. Inefficient

F3

"performance envelope"

mission needs.

* Suppose I could get you a bird—

One year Infantry—

Jasmine Court

Helicopter Consultant

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~~F3~~

"performance envelope"

mission needs.

* Suppose I could get you a bird–

→ One year → Infantry–

Jasmine Court

Wang

2280 MVP - F/R Cartridge Disk
Phoenix Drive

Software: Redshaw, Inc.
Projects, Inc. (Personal Lines Rating)

IBM PS2 - Model 30

IBM AT

IBM PC

IBM PS2 - Model 30

IBM PS2 - Model 30

interesting tale
With a load of 25 yrs not cost effective.
75 to 80 people
you'll change the transportation pattern in Europe.
fly directly to London, Berlin

V-22 ACHIEVES FULL CONVERSION TO AIRPLANE MODE IN FLIGHT

Two weeks ago, the Bell/Boeing V-22 tiltrotor aircraft made aviation history as it reached one of the program's most important milestones, transition from helicopter into full-airplane mode while in flight. The V-22 was flying at an altitude of 6,000 feet and a speed of 155 knots when the conversion took place. The test was carried out at Bell's Flight Research Center in Arlington, Texas.

In the first full rotation of the aircraft's 38-foot diameter proprotors forward from 90 degrees (vertical) to 0 degrees (horizontal), the Osprey's forward-swept wings gradually generated more lift and the proprotors began to function more like traditional propellers and less like a helicopter rotor.

economical payload

Osprey

During the historic 65-minute flight, test pilots Dorman Cannon and Roy Hopkins assessed the tiltrotor aircraft's maneuverability at various speeds and nacelle angles.

1000 of them possible.
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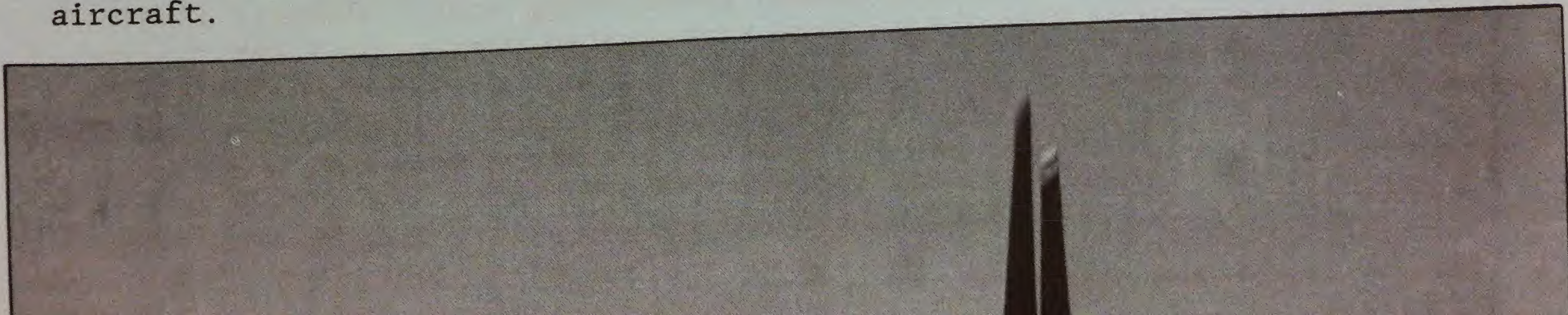
Although conversion to an aircraft mode marks the end of phase two of V-22 testing, an extensive portion of the overall flight testing program still remains to be completed. Eventually six prototype aircraft will comprise the test program, all aimed at achieving different results. For example, Aircraft One's primary mission is to explore flight loads, vibration levels and aeroelastic stability, maximum-gross-weight takeoffs and landings and high altitude flights.

Aircraft Two will test primary and automatic flight control systems, carry out development tests, icing tests and demonstrate flying qualities of the V-22 aircraft.



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Contracts

MDHC SELECTS 19 SUBCONTRACTORS FOR PARTICIPATION ON APACHE LONGBOW

McDonnell Douglas Helicopter has selected 19 firms to participate as subcontractors on the potential $3 billion Longbow Apache program, MDHC officials recently announced. The Army intends to procure 227 AH-64 Apache attack helicopters equipped with the Longbow radar system. If the system is eventually deployed on the LHX helicopter, the potential value of the Longbow radar program could reach $5 billion.

MDHC was recently awarded a $200 million Army contract to design and develop four prototype Apache helicopters configured with the Army's new sophisticated Longbow millimeter wave radar system. Total value of the subcontract work, according to Longbow Apache program manager Ed Schuman, is $60 million.

The subcontractors and the program areas they will be involved with follow:

Garrett Auxiliary Power Division, Allied Signal Aerospace--auxiliary power unit; ACME Utah Research and Development Co.--battery and battery charger; Bendix Flight Systems Division, Allied Signal Aerospace--display processor and multi-function displays.

General Electric--enhanced digital automatic stabilization equipment; Parker Hannifin--environmental control system; Fluid Components--fuel flow sensors; Electric Power Division, Allied Signal Aerospace--generator and transformer rectifier; ITT Avionics--global positioning unit; Garrett Fluid Controls Division, Allied Signal Aerospace--integrated pressurized air system.

Litton Guidance and Controls--inertial navigation unit; Litton Systems Canada--keyboard unit and up-front display; Page Aerospace--lighting power supply; Parker Bertea Aerospace Control Systems Division--main and tail rotor actuator; J-TEC Associates--air data system.

Smiths Industries--power load management system and pylon interface unit; Simmons precision Motion Controls Division--stabilator actuator; SCI Technology--system and weapons processors; Barber Coleman Co.--trim actuator.

Suppliers of government furnished equipment (GFE) are:

Martin Marietta Electronic Systems and Westinghouse Electric Development and Operations Division--Longbow fire control radar system; Martin Marietta Electronic Systems--target acquisition designation system/pilot night vision system; Collins Government Avionics Division, Rockwell International--airborne target handover system processor; and Valley Systems Division, General Dynamics--Stinger missiles.

CAE-LINK AWARDED SAUDI SIMULATOR CONTRACT FOR DESERT HAWK

Link Flight Simulation has been awarded a $13 million contract to provide the flight simulator for the Saudi Arabian "Desert Hawk" helicopter. The simulator for the Desert Hawk will be an adaptation of the simulator currently used by the U.S. Army for the Sikorsky-built UH-60 Black Hawk. It differs however, in that unlike the UH-60 simulator, the Desert Hawk model will include T700-GE-701A engines (instead of the -700 engines used on the Black Hawk) and the Omega global navigation system. Delivery of the first simulator unit is set for 1992.

The Desert Hawk simulator is intended to provide Saudi helicopter pilots with basic, transition, refresher and advanced training in flight operations, nap-of-the-earth (NOE) flight, emergency procedures, and combat tactics for Desert Hawk pilots and co-pilots. The visual systems incorporated into the Desert Hawk simulator will use the Army Tactical Digital Image Generation (ATACDIG) system, a full-color, daylight/dusk/night system, which is night vision goggle compatible. Eventually the simulator will use special Defense Mapping Agency (DMA) databases for Saudi mission operations.

Helicopter News Digest

- Army Major General Donald Williamson assumed command of the Army Aviation Systems Command on Sept. 13. Williamson had been AvsCom's deputy commander since 1987. He succeeds Major General Richard Stephenson, who assumes command of the Army's Operational Test and Evaluation Agency in Alexandria, Va. Williamson was also the program manager for the AH-1 Cobra helicopter from 1980-85.

- Racal Avionics has recently been awarded a "major contract" to supply Doppler-based navigation management systems for Sikorsky S-76 helicopters used for search-and-rescue missions in Hong Kong. The contract, awarded through Sikorsky, includes the supply of Racal Doppler 91 Velocity Sensors and R-Nav 2 navigation management systems and equipment. The Doppler 91 is specifically designed for over-sea operations, thus optimized for Doppler coupled "transition-down" and "auto-hover" maneuvers.

- Rolls-Royce/Turbomeca RTM322 engine development program has begun ground-running in preparation for the next phase of flight trials aboard a S-70C helicopter. The next tests will be made using production-standard RTM322 engines equipped with twin-lane full-authority digital control units (FADEC). Tests will cover all phases of engine handling with FADECS, including a complete full authority spare channel available for back-up. Rolls-Royce officials say the RTM322 will be available for deployment aborad a number of helicopters, including the EH-101, NH-90, Apache, Black Hawk and Seahawk.

- Aerospatiale has signed an agreement with the new Norwegian helicopter firm Braathens Helikopter for 4 AS 332L1 Super Puma helicopters. Scheduled for delivery beginning in May 1990 at the rate of one helicopter per month, the first Super Puma will enter service in September 1990. Braathens will operate the Super Pumas in support of Phillips Petroleum (U.S.), Statoil (Norway) and Norsk Hydro (Norway). According to Aerospatiale, Braathens has also expressed an interest in the upgraded Mark II version of the Super Puma.

- The Sikorsky S-76C equipped with Turbomeca Arriel 1S1 engines will provide greater payload and reliability without sacrificing range, Sikorsky officials say. The first two S-76C aircraft are slated to be delivered in mid-1991. The additional power provided by the Arriel 1S1 engines, will give the S-76C a Category B useful load at sea level and a 5-knot faster cruise speed in hot-and-high conditions. Turbomeca is currently working toward certification of the engines with a 30-second contingency rating, allowing improved Category A/Group A Phase II performance.

- The Army recently accepted delivery of the 500th AH-64 Apache attack helicopter during ceremonies at McDonnell Douglas Helicopter's facilities in Mesa, Ariz. The first Apache was delivered in January 1984. The 500th Apache is slated to be assigned to the 1st Aviation Regiment stationed at Hanau, West Germany following the unit's six-month combat training exercises at Fort Hood, Texas. "Every day we are learning that the Apache's warfighting potential exceeds our expectations," Army Vice Chief of Staff General Robert Riscassi said.

- The Coast Guard's first Sikorsky-built HH-60J Jayhawk Medium Range Recovery helicopter was recently rolled out at Sikorsky's Stratford, Conn., facilities on Sept. 14. Delivery of the first of 24 helicopters is scheduled to be delivered in March 1990. The Coast Guard has a stated need for 32 helicopters. The Jayhawk is intended to replace the Sikorsky-built HH-3F helicopter. The HH-60J has a range of 300 miles offshore and can maintain an on-scene endurance presence of 45 minutes.

SEXTANT EXPECTED TO ACQUIRE U.S. ELECTRONICS FIRM

In order to compete and participate in the U.S. defense market, Sextant Avionique (the recently formed French avionics consortium) will either purchase outright or acquire a partial share in an American electronics firm, a Sextant official told HELICOPTER NEWS at the recent Helitech-89 show held at Redhill Aerodrome, England.

Sextant believes a foothold in the U.S. market, including U.S.-based manufacturing facilities, is a prerequisite for winning future Pentagon contracts, the official added.

Such an acquisition, however, the official explained, would most likely not occur until next year, following the complete establishment of a corporate infrastructure for Sextant. Since Sextant was formed through the amalgamation of four previously independent subsidiaries (Crouzet, SFENA, EAS and Thomson-CSF's AVG division), the setting up of a new company organization is a very complex and time-consuming process, the official explained.

Once Sextant has acquired a U.S. defense electronics concern, its primary emphasis will be to compete head-to-head against the major U.S. avionics firms in both the North American and European markets, emphasizing participation in helicopter programs, he said.

The official noted that on European helicopter programs, for example, U.S. avionics components dominate. Sextant is currently promoting its heads-up display technologies for U.S. helicopters, which the U.S. Army is now using on the targeting system for the Air-to-Air Stinger (ATAS) missiles deployed on the OH-58D helicopter.

In Europe, Sextant intends to focus heavily on its core businesses, centered around supplying avionics for the future Franco-German PAH-2/HAC/HAP helicopter, the Airbus civil jetliner and the Ariane space booster program. However, the new consortium may even purchase a European electronics manufacturer in the future, the official said.

Responding to European fears (particularly expressed by the West Germans and British) that Sextant may dominate the European avionics field, the official noted that both the West Germans and the British have recently been pursuing similar strategies.

Daimler's acquisition of Messerschmitt Bolkow Blohm (thereby creating a new Deutsche Aerospace subsidiary) and the GEC/Siemens takeover of Plessey aim to achieve the same objectives as Sextant, he explained. Given the declining state of defense spending, the Sextant official predicted that such mergers can be expected to continue into the future.

Sincerely,

The Editors

Robert D. Holzer, Editor
Ed Hazelwood, Managing Editor

P.S. Get the complete details on the future of the U.S. and foreign civil helicopter market . . . FREE! See the enclosed flyer for more details.

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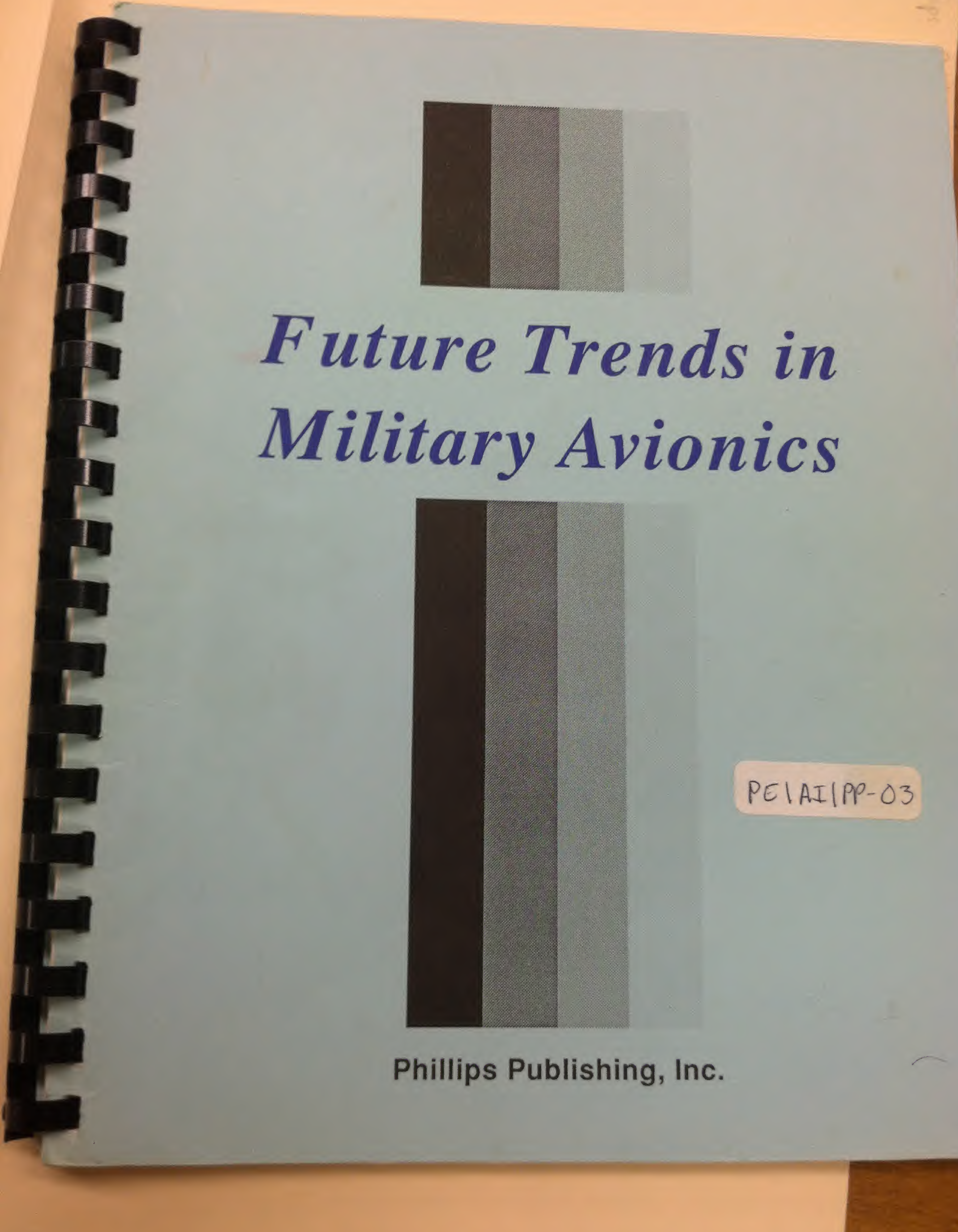

Future Trends in Military Avionics

PE\AI\PP-03

Phillips Publishing, Inc.

Future Trends in Military Avionics

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Dear Avionics Report Subscriber:

Phillips Publishing provides you with **FUTURE TRENDS IN MILITARY AVIONICS**, a special report that will help you in analyzing and understanding the increased role of avionics by all parts of the military. This valuable report is an excerpt from a comprehensive, in-depth, 700+ page market study, The Military Avionics Market: 1990 and Beyond. The entire report sells for $1995, but you are receiving this incisive executive briefing FREE! The complete market study can be purchased from Phillips Publishing, Inc. 7811 Montrose Road Potomac, MD 20854 (800)722-9120. For more details, see the flyer at the back of this book.

The Military Avionics Market: 1990 and Beyond was prepared for Phillips Publishing by S & W Associates, a highly respected defense consulting firm. S & W Associates has provided major strategic plans for companies such as IBM and Lockheed while also furnishing technical analysis and procurement recommendations for the Air Force, OSD, and other military organizations. S & W has also authored major reports on C3I, Electronic Warfare, Very High Speed Integrated Circuits, the DoD Budget, and the Military Fiber Optics Market.

Phillips Publishing is a fast-growing information company serving the defense, telecommunications and finance industries. Concise, hard-hitting management tools, Phillips Publishing newsletters provide defense professionals with timely, actionable information on Soviet military and space developments . . . the military's applications of fiber optics . . . the U.S. space station program . . . DoD programs and contracts . . . and more.

The Phillips Publishing team of defense journalists and editors are led by the award-winning Defense Daily, published for over 30 years. This unique blend of experience provides a highly qualified, authoritative and reliable news perspective for today's defense professional.

For more information on the Phillips Publishing family of newsletters and S & W's market study, The Military Avionics Market: 1990 and Beyond, please refer to the flyers at the end of this book.

Sincerely,

The Editors

A. Synopsis of Fundamental Issues

1. Scope

Avionics represents the combination of aviation systems and instruments, onboard communications, computer capabilities and those supporting electronics systems which increase platform effectiveness and efficiency through the automation of both manual processes and mechanical systems.

2. Growth of the Avionics Market

Avionics is one of the largest high technology programs in the Department of Defense. Its history of extensive growth can be traced from the early 1960's when increased U.S. involvement in the Vietnam conflict occurred, to current requirements for advanced fighters and bombers needed to meet the Soviet challenge in the 1990's and beyond. These requirements, coupled with those for "modernized" aircraft, provide the basis for a continuing growth of the avionics market.

In the DoD funding of avionics programs, note that:

The United States Government spends one out of every twelve budget dollars on aircraft and aviation systems.

During FY 1990 and FY 1991 DoD projects spending $31.7 billion and $35.1 billion, respectively, for aircraft systems and an additional billion in Research Development, Test and Evaluation (RDT&E) for avionics.

Future aircraft electronic systems will account for over 65% of aircraft costs. These systems will be directed toward total automation using artificial intelligence and fully integrated electronics that will reduce pilot workload and increase system effectiveness.

3. Impact of the Soviet Threat on Avionics

The continued development and expansion of avionics programs are essential in meeting a rapidly expanding Soviet aircraft and electromagnetic threat. This is a real threat and coupled with the perceived threat of projected future Soviet force capabilities, results in the sustained updating of U.S. requirements. These requirements identify those intelligence and operational capabilities required to counter the threat and provide the superior U.S. force capability necessary to operate successfully in any projected hostile environment. This sustained emphasis on the expansion of avionics programs requires the use of leading state-of-the-art technology to provide the most advanced automated support systems for both new generation

Table 1-A-1

PROCUREMENT OF AIRCRAFT SYSTEMS

	FY'88	FY'89	FY'90	FY'91
ARMY	$ 2.5	$ 2.9	$ 3.2	$ 3.3
NAVY	$ 9.5	$ 9.2	$10.6	$11.2
AIRFORCE	$11.8	$16.1	$17.9	$20.6
TOTALS:	$23.8	$28.2	$31.7	$35.1

Aerospace and Defense Publications

From **Phillips Publishing, Inc.**

Phillips Publishing, Inc. is one of the largest and fastest growing information companies serving the defense industry. Its extensive family of aerospace and defense publications provides its readers with the most current and complete news coverage of the defense industry. Phillips Publishing publishes an array of widely respected publications led by the award-winning *Defense Daily*, published for over 30 years. A seasoned team of defense journalists and editors provides a highly qualified, authoritative and reliable news perspective for today's defense professional.

•Defense Daily•

Published for more than 30 years, ***Defense Daily*** provides extensive and exclusive coverage of key defense/aerospace news. This award-winning market intelligence report gives you a direct line to the White House, Congress, the Pentagon, and every major aerospace center worldwide. You will find details of key aerospace and defense contracts, who's funding what, plus step-by-step development of every major program -- all wrapped up with an objective overview that keeps you up to date on a daily basis. At no additional charge, ***Defense Daily*** also provides Special Supplements twice weekly featuring exclusive interviews and in-depth analysis of key issues.

•Defense Industry Report•

This biweekly newsletter provides a complete summary of the latest news developments in the defense industry including a rundown on what's happening in the Pentagon and on Capitol Hill. ***Defense Industry Report*** brings readers information on key DoD programs and contracts including aircraft, missile and space systems, electronics and communications, weapons and ordnance, vehicles and ships. It includes listings of RFPs and potential bidders and it reports on defense research and development contracts and programs.

•Helicopter News•

For 15 years, ***Helicopter News*** has provided the latest information on the highly complex and competitive helicopter industry. This biweekly newsletter brings you news and special reports about industry issues from both the military and civil markets.

Helicopter News includes comprehensive coverage of avionics, power plants (engines), new helicopter development programs, government contracts, and emerging technologies. It also reports on regulations, accident investigations and legislation affecting the helicopter industry.

•Space Station News•

Space Station News is the only newsletter devoted to covering the multibillion dollar space station program. Each biweekly issue focuses on the space station program, the international partners and the industries which will be involved. The newsletter pays close attention to the program's budget battles within NASA, on Capitol Hill and at the Office of Management and Budget.

Space Station News also keeps track of Soviet space efforts – particularly aboard their Mir space station – and commercial space ventures. The newsletter also covers advanced space technology, particularly in the areas of robotics and computers.

•Soviet Aerospace•

Soviet Aerospace contains the latest information on the Soviet Union's military and space programs. This biweekly newsletter is often quoted in the national news media for its insightful and exclusive reporting. Specific features include: a complete listing of all Soviet space launches; updates on events aboard the Soviet Mir space station; analysis of arms control proposals; information on Soviet submarine and anti-submarine developments; reports on Soviet aircraft and aviation trends; and reports on Soviet conventional force developments.

•Military Fiber Optics News•

Military Fiber Optics News provides constant updates on the burgeoning use of fiber optics in the military as well as the growing number of fiber optic projects being developed in other parts of the federal government. Each biweekly issue brings you the latest intelligence on fiber optic applications, new products, and R&D activities. The newsletter features interviews with industry and government officials, provides analysis of key developments, and presents a comprehensive listing of bid solicitations and awards, complete with names and numbers of contact people.

•Avionics Report•

This biweekly newsletter is devoted to covering the fast growing avionics industry. ***Avionics Report*** keeps you up to date on all the business news and technology developments in this $47 billion marketplace. Our Washington-based staff provides an insider's view of all key developments affecting avionics on Capitol Hill and at the Pentagon, NASA, FCC and FAA.

Avionics Report covers the military, air transport, corporate and private sectors. It tracks business opportunities, closely follows trends in avionics technology, and reports on all significant electronic warfare developments.

•Avionics Magazine•

Since it began 10 years ago, ***Avionics*** has been the only independent trade magazine devoted exclusively to airborne systems, ground navigational aids, Air Traffic Control and aerospace electronics. With its monthly insight into the avionics industry, ***Avionics*** interprets the meaning behind today's fast-changing technology. It serves as an indispensable tool for people who design, specify, manufacture and operate today's avionics systems. Feature issues include: Integrated Flight Management, Long Range Navigation, Test Equipment, Airline and Military Avionics and Business Aircraft/Helicopter Avionics. Plus, a special 13th issue provides an annual Avionics Buyers Guide.